

SECTION 1

STORMWATER RUNOFF MANAGEMENT

This fact sheet addresses the impacts stormwater runoff has on water quality and how *you* can make a difference with *Best Management Practices (BMPs)*. BMPs are actions you can take to protect our natural resources.

The ultimate goal of this information is to minimize the negative impacts of stormwater runoff to lakes, rivers, and streams.

1. Read the facts and information in the following pages.
2. Fill out the Risk Assessment Worksheet in order to analyze your property's specific needs.
3. Fill out the Action Worksheet, then **take action!**

Why is Stormwater Runoff a Problem?

Stormwater runoff is the flow of water from rain or melting snow that does not soak into the ground due to *impervious* surfaces. Under natural forested conditions, stormwater is absorbed into the ground, but, as an area becomes developed or altered with structures, roads and driveways, less water is absorbed into the soil. Not only does this disrupt the entire water cycle, it increases the amount of water needing to be diverted (Figure 1-1).

Increased runoff is generally channeled into ditches, storm sewers, and road gullies, which often lead to lakes, rivers, and streams. Runoff picks up and carries pollutants such as fertilizers, pesticides, petroleum, heavy metals, and hazardous waste products. The movement of these materials into surface water creates a number of problems, including excess aquatic plant and algae growth; low dissolved oxygen (used up by decaying plants; negative impacts to fish, wildlife, and recreation; degraded spawning beds; and murky water. Runoff that is not diverted flows overland unmanaged, creating problems such as drinking well contamination, flooding, and erosion (Figure 1-2).



Figure 1-1 Improperly placed sediment controls allow polluted stormwater runoff into storm drain which flows directly to surface water.

Responsibility

Our region is widely known for its world class fishing, immense beauty and good water quality, which makes it a popular destination for people worldwide. However, increased waterfront development raises concerns on how to maintain the good water quality we currently enjoy. If you live on the waterfront you have a special responsibility and opportunity to prevent water pollution. **One very important action to take on your property is the control of stormwater runoff.** Homeowners are principally responsible for stormwater retention or discharge from their property. Your property alone is probably not a significant source of pollution, but the cumulative effect of numerous properties can have a substantial impact on water quality.



Figure 1-2 Flood event carries tons of sediment and polluted runoff into CDA Lake.

Minimizing Stormwater Runoff

Traditionally, the objective of stormwater management has been to transport runoff as quickly as possible through the drainage system in order to prevent flooding and protect lives and property. Years of research now shows how contaminated stormwater negatively affects public health and wildlife habitat. New practices encourage decreasing runoff rather than merely diverting it.

Reducing the amount of *impervious surface* on your property and directing runoff into an area where water can infiltrate are the best ways to minimize runoff. Ideally, stormwater will move slowly and absorb into the ground. Impervious surfaces are hardened surfaces that don't allow water to pass through. This includes roofs, sidewalks, carports, roads, driveways, and patios (Figure 1-3). As you look around your property for stormwater problems, it is important to remember that you may not see the impacts created by stormwater coming off your property. Water from your land may quickly run off your driveway, along the curb, into a clogged culvert, and flood a road two miles down. In other words, everyone needs to do their part. If you reduce stormwater coming off your property, the entire drainage system will have less water to manage.

To begin thinking about stormwater and how it affects your property, walk your property during a heavy rain storm, and watch where the water drains. Look for areas of erosion, potential flooding and water draining directly to surface water.

If you have an existing house and landscape, please learn the BMPs outlined in this section to improve any stormwater runoff issues you discover while evaluating your property.

If you are in the developing phase, a general step-by-step process is recommended for property located near water bodies, on steep slopes or gradients, and on land with highly erodible soils. Begin with a quality site plan for pre-construction, construction, and post-construction. Use BMPs, and routinely practice pollution prevention. For more information on site planning and stormwater management, please read Section 6: New Construction. There are also numerous online and community resources available (See Resource Directory on page 1-8).

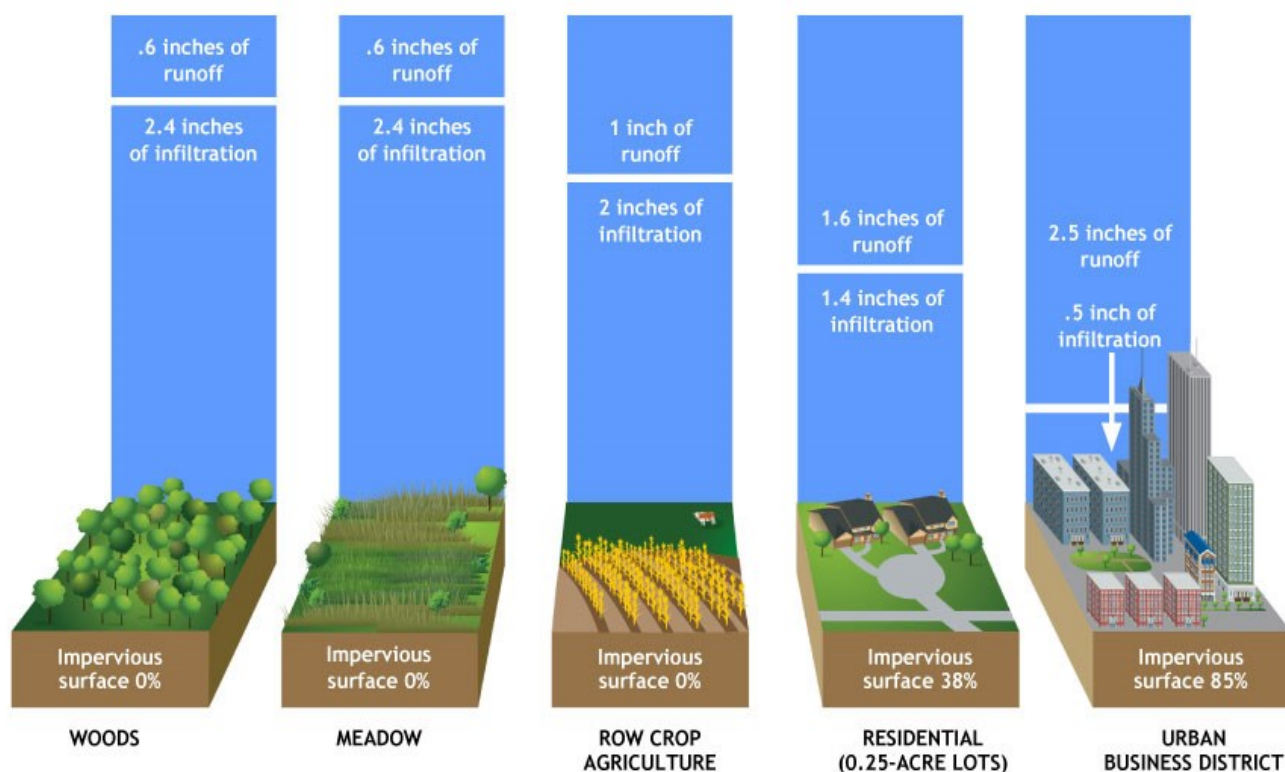


Figure 1-3 Percentage of impervious surface related to infiltration rates following a 3 inch rain storm.

Buildings and Landscapes

- Limit paving, compacted dirt and covered areas.
- Use permeable pavers, flagstones, river rock or planted ground covers on patios, walkways and areas around buildings (Figure 1-4).
- Limit clearing and grading on slopes.
- Minimize cut and fill for roads, sidewalks, and footpaths to reduce erosion and still provide access.
- Preserve existing vegetation. Only disturb areas that are absolutely necessary for structures and access.
- Do not compact or pave wasted space such as corners near buildings that are not large enough for parking or driving.
- Use steps when a walkway must go directly up and down a slope, particularly near the shoreline.



Figure 1-4 *Decorative permeable pavers.*

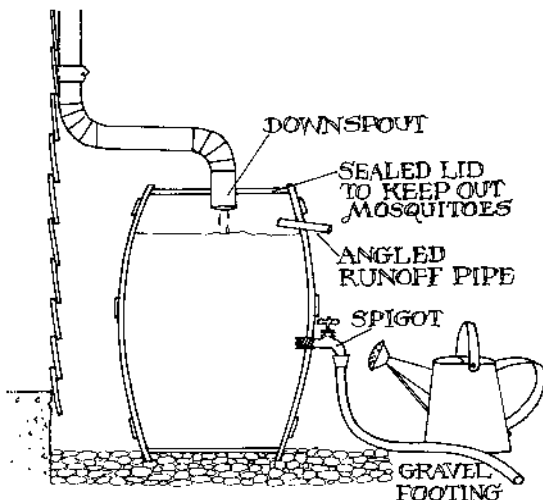
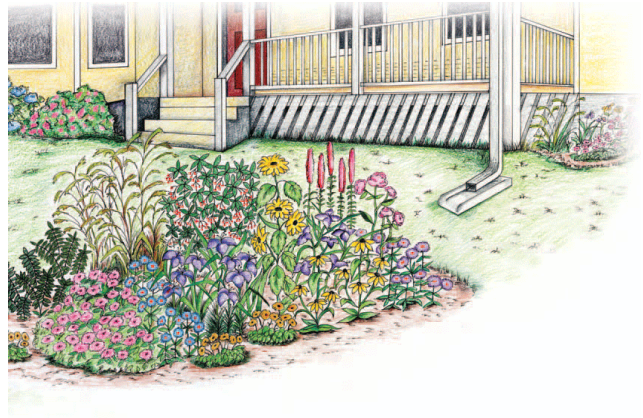


Figure 1-5 *Rain barrel installed below rain spout.*



- Install a rainwater catchment system to collect and reuse for irrigation. In this region, a 2000 square foot roof could easily generate over 41,000 gallons of water a year (Figure 1-5).
- Install rain gutters and keep them free of debris. Place a “rain garden” below a downspout instead of concrete (Figure 1-6).
- Use native plants in your landscape, especially as a buffer around surface water. Native plants are very low maintenance.
- If you are building a new house or garage consider positioning rooftops so they are perpendicular to the slope.
- To reduce erosion, avoid creating walking paths straight down slopes. Compacted soil on footpaths also promotes excessive runoff.

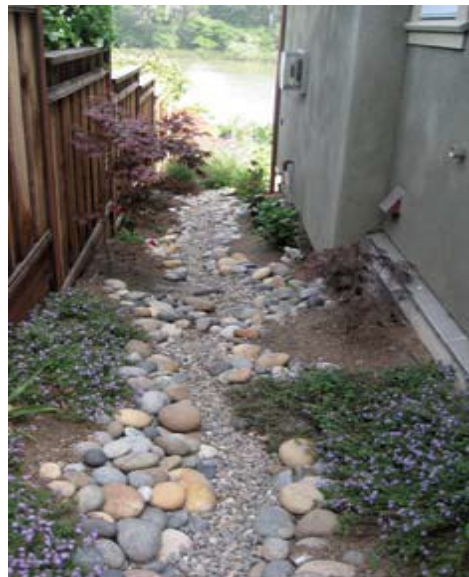


Figure 1-6 *A rain garden installed below a downspout.*

Roads, Driveways, and Ditches

- Keep culverts unplugged (Figure 1-7), keep drainage ditches deep and vegetated (Figure 1-8), keep cut banks (above slope) and fill banks (below slope) from eroding by establishing vegetation.
- Minimize semi-impervious and impervious surfaces. Use permeable alternatives wherever possible (Figure 1-9).
- Incorporate a good gravel base into your private roads and driveways instead of only compacted dirt.
- Locate driveways and all walkways away from slopes because steeper slopes have greater erosion potential; if you must cross a hillside, follow the contour of the slope.
- Minimize road crossings over waterways and cross at a right angle to the stream if possible.
- Sweep paved parking areas and walkways instead of washing them down with a hose to prevent sediment, salt, and petroleum products from washing off in runoff. Cover stockpiles of salt, sand, or soil with a tarp or store them in a building.
- Use roadside areas covered with grass for runoff and storage of snow instead of impervious and semi-impervious surfaces.
- Install water bars, rolling dips, trench drains, or other diversion methods on sloping roads and driveways to slow and divert runoff (Figure 1-10). For more information on diversion techniques, see Section 7: Access Roads and Driveway Runoff.
- Use existing natural drainage systems such as valleys or any low areas instead of digging new ditches.
- Design culverts and drainage structures to handle excessive amounts of runoff. Assistance is available from numerous public agencies (Resource Directory page 1-8).

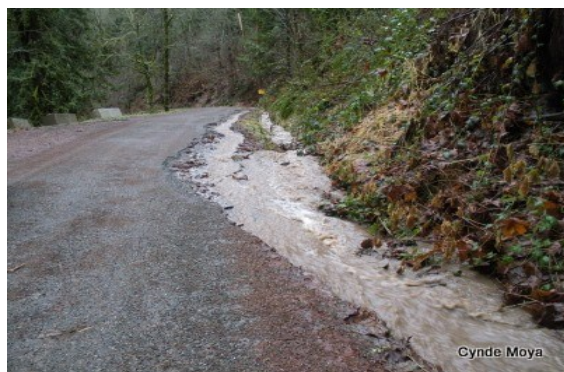


Figure 1-7 *The result of an undersized/clogged ditch.*

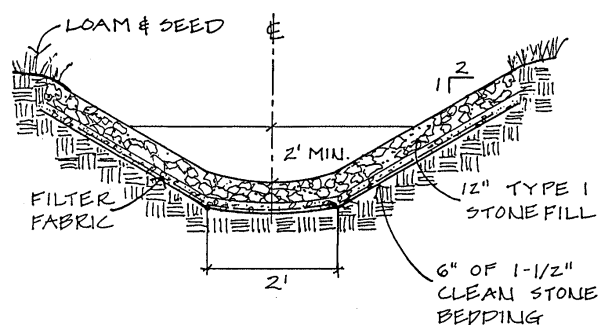


Figure 1-8 *Recommended ditch design.*



Figure 1-9 *Permeable pavers on driveway allow stormwater to infiltrate.*



Figure 1-10 *Decorative trench drain in driveway directs runoff to vegetative landscaping for infiltration.*

Reducing Pollutants in Runoff

Stormwater is unavoidable, but its effects can be reduced by keeping harmful chemicals and materials out of runoff. Pollution prevention is the easiest way to keep the CDA Basin safe, clean and inviting. Sources for concern are bare soils, roads, driveways, and yards. **Stormwater and snowmelt collect and transport the following pollutants to surface and/or ground water:**

Nutrients - Phosphorus and/or nitrogen from fertilizers, detergents or animal wastes.

Bacteria and viruses - Human and animal wastes.

Litter - Glass, plastics, etc...

Organic chemicals - Pesticides and petroleum.

Heavy metals - Lead, copper, zinc and cadmium that are usually associated with sediments.

Sediment - Combination of silt/clay with chemically bound phosphorus, forest duff, stones, sand, gravel,

Lawn and Garden Care

Lawn and gardens near the shore must be carefully planned and maintained to prevent possible contamination to stormwater runoff. Grass clippings, excess fertilizer, and other yard wastes will wash away during storm events. Excess fertilizer will add nitrogen and phosphorus to lakes, rivers, and streams promoting algae and aquatic weed growth (Please read Section 2: Lawn and Garden Management for more information).

- Avoid applying fertilizers and pesticides *at least* 25 feet from lakes, rivers, and streams.
- Don't fertilize if you don't need too. Get a soil test kit to determine whether you need fertilizer. This could save you money.
- Choose a fertilizer with little to no phosphorus. Turf rarely needs additional phosphorus. Check phosphorus levels in your soil to find out.
- Native vegetation is a quality alternative to cultured lawns and landscapes. Native plants do not need additional fertilizers or water; they take care of themselves.

Animal Wastes

Animal droppings can be troublesome in two ways. First, pet and livestock wastes contain nutrients that can promote the growth of algae in lakes, rivers, and streams. Second, wastes can be a source of disease. The risk of stormwater contamination increases if pet wastes are allowed to accumulate in animal pen areas or left on lawns, roads or driveways where runoff can carry them to surface water. Reduce the risk of contamination by manure associated with dogs, cats, cattle, horses, or waterfowl by disposing of it upland.

- If animal manure is stacked, it should not be located within 150' of a waterbody. Always divert runoff from manure stacks toward vegetated area for filtration. Covering manure piles is a great solution to prevent manure runoff.
- Apply stacked manure, once it is fully composted, to make effective use of fertilizers.
- Don't let dog waste accumulate in one central area. Either give them lots of space away from water or routinely pick up waste and put it in the trash.
- Keep livestock fenced out of lakes, rivers, and streams.

Why is Phosphorus a Problem?

Phosphorus receives a good deal of attention when considering lake water quality because it accelerates algae and aquatic plant growth. Phosphorus is considered a "limiting nutrient" to plants. Additions of phosphorus above natural levels can accelerate plant growth, which ultimately depletes dissolved oxygen. When this abundance of plant material breaks down, it uses the dissolved oxygen in water, robbing it from fish. Overall concentrations of phosphorus in Lake Pend Oreille are quite low, but in areas of dense residential development along the shoreline phosphorus concentrations can be much higher than undeveloped areas.

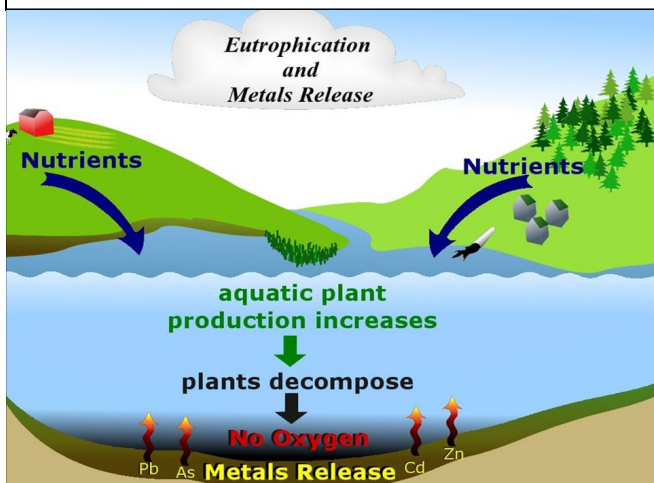


Figure 1-11 Eutrophication and metals release dia-

Protecting and Creating Vegetative Buffers

Vegetative buffers or riparian areas are heavily vegetated areas surrounding water bodies (Figure 1-12). The width of this area varies, but the natural function is to stabilize soil, filter pollutants, and provide fish and wildlife habitat. This area is home to many plants and animals, and it is the most important area of lake, river, and stream environments. The thick vegetation works to reduce erosion and filter out pollutants. Overhanging branches provide shade and a source of insects and seeds. Riparian zones and vegetative buffers are quickly disappearing due to development along the shorelines (Please read Section 8: Forest Lot and Riparian Area Management for more information).



Figure 1-12 A vegetated buffer between water and upland land use protects water quality.

- For new home and lot construction, retain a high percentage of native shrubs and trees along the shoreline. As a guideline, remove no more than 20% of the native vegetation for a walkway, beach access, and home safety (Figure 1-12).
- For existing residential and business development, minimize disturbance in riparian zones along lakes, rivers, and streams. Leave native plants where possible and choose species that require little maintenance. **Kootenai County Site Disturbance Code requires a 25' setback for disturbance or structures along lakeshores.**
- Contact local nurseries, UI Extension Office/Master Gardeners, or the Native Plant Society for recommendation on native plant design in vegetative buffers (see Resource Directory page 1-8).
- Keep cattle and horses out of riparian zones. Large animals trample riparian vegetation and stream banks, which results in erosion.

Caution with Hazardous Household Products



Use safe housekeeping practices when storing, handling and disposing of potentially harmful materials such as fertilizers, pesticides, cleaning solutions, paint products, automotive products, pharmaceuticals, florescent lights and swimming pool/hot tub chemicals (Please read Section 5: Hazardous Materials for more information).

- When possible use **alternative products** that are non-toxic and environmentally friendly.
- **Do not** dispose of household hazardous waste:
In the trash
Down storm drains
In creeks, streams, rivers, or lakes
Down sinks and toilets



- Unused household hazardous wastes can be disposed of properly at recycling/transfer stations in Kootenai County and Spokane County (See Resource Directory page 1-8).
- Change buying habits; purchase fewer products and buy in appropriate quantities.
- Store products above flood levels of basements and storage sheds and off ground level.
- Read and follow instructions on product labels.
- Store products in their original containers, and keep them well labeled.

Vehicle Use and Engine Maintenance

Cars and boats are a major source of pollutants such as heavy metals, oil and grease, and other hydrocarbons through exhaust, leaks, spills, corrosion, and wear and tear of parts. These pollutants are deposited on roadways and carried into receiving waters by stormwater runoff (See Section 5: Household Hazardous Wastes).



- **Don't Spill.** Use drip pans and draining boards to capture oils and solvents, then dispose properly.
- Use rags and dry absorbent materials like kitty litter and baking soda to clean up spills, leaks, and drips.
- Clean up oil stains and avoid outdoor spills of antifreeze, brake fluid, and other engine fluids.
- **Recycle unused fluids.** Used oil, antifreeze, and cleaners can be taken to county recycling/transfer stations (refer to the Resource Directory page 1-8).
- **Never dump used oil, antifreeze, or gasoline down a storm drain, in a ditch, or on the ground.** These wastes contain toxic compounds which can end up in the lake and drinking water.
- Wash vehicles on the lawn or commercial car wash. Do not use cleaners that contain ammonia, chlorinated solvents, petroleum distillates, or lye.
- Buy and use only nontoxic, **phosphate-free**, biodegradable cleaners.
- Routine maintenance of your vehicle/boat helps prevent oil leaks and ensures efficient fuel consumption and clean exhaust.



Figure 1-13 Vehicle oil going down storm drain.

Erosion and Sedimentation Prevention

If you are building a new house or structure, landscaping, or putting in a new driveway or road, you need to consider the effects of construction and other activities on nearby surface water. Bare soil is easily washed into nearby water. Excess soil, in suspension, washes into nearby streams and buries coarse-sized channel sediment that is necessary for fish spawning. Sediment also carries excess phosphorus into surface water (for detailed information on erosion prevention please read Section 6: New Construction).

- Preserve existing vegetation whenever possible. Once vegetation is removed and soil exposed, the rate of erosion is greatly increased.
- **Cover bare soil immediately** with layer of straw or other organic material (for hay or straw, use one 50 pound bale per 500 square feet). This covering will help keep soil in place.
- Replant disturbed areas as soon as possible.
- When landscaping or building, stage construction so that one area is stabilized before another area is disturbed.
- If you have rainspouts and gutters, direct the discharge to a grassy area, garden, or forest swale, where it can soak into the ground.
- Avoid damaging adjacent property. Water does not stop flowing at your property line.
- Design culverts and drainage structures to handle excessive amounts of runoff.
- Protect storm sewers from sedimentation so they are able to carry stormwater as intended.
- Inspect construction projects continually for potential erosion issues. Inspect immediately after installation of erosion control measures, following any severe rainstorm, before reseeding, and when nearing the completion of construction work.



Figure 1-14 Straw mulch covering bare soil to prevent erosion.

Resource Directory

Bonner County Planning and Building

1500 Highway 2, Suite 208
Sandpoint, ID 83864
(208) 265-1458

Bonner County Solid Waste and Hazardous Materials Transfer Station

(208)255-5581

Bonner Soil and Water Conservation District

1224 Washington Ave, Suite 101
Sandpoint, ID 83864

City of Sandpoint

(208) 263-3370
www.cityofsandpoint.com

Idaho Department of Environmental Quality (IDEQ)

(208) 769-1422
www.deq.idaho.gov

University of Idaho Extension Water Education

(208) 292-1287

Valuable Websites

Center for Watershed Protection

www.cwp.org
www.stormwatercenter.net

Kinnikinnick Native Plant Society

[www. nativeplantsociety.org](http://www.nativeplantsociety.org)

Stormwater Erosion Education Program (SEEP)

www.panhandleseep.org

Stormwater Authority

www.stormwaterauthority.org

Stormwater

(Journal for Surface Water Professionals)

www.stormwater.org

RISK ASSESSMENT WORKSHEETS

Stormwater Runoff

Assessment Sheet 1: Reducing Pollutants in Runoff

Use this Assessment Sheet to identify potential environmental risks. For each question indicate your risk level in the right-hand column. Some choices may not correspond exactly to your situation. Choose the response that best fits. When finished turn to the **Action Worksheet** on page 1-11 and record your medium and high-risk practices. Your goal is to lower your risks. Use the BMP recommendations in this manual to help you determine the best solution.

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Automotive wastes	Drips and spills are cleaned up. Oil and fluids are recycled. Dirty car parts and other vehicle wastes are kept out of runoff.	Drips and spills are not cleaned up. Car parts and other vehicle wastes are left on ground.	Used oil, antifreeze, and other wastes are dumped in the ditch or onto the ground.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Vehicle washing	Vehicles washed on a lawn or gravel drive with phosphate free soap. Runoff diverted to vegetated areas.	Vehicles are washed at a commercial car wash, but don't know if the operation uses BMPs.	Vehicles are washed on an impervious surface and runoff runs directly into lake or stream. Soap type unknown.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Storage of pesticides and other chemicals	Chemicals are stored in waterproof containers in a garage, shed or basement that is protected from stormwater.	Chemicals are stored in waterproof containers but within reach of stormwater.	Chemicals are stored in non-waterproof containers outdoors or within reach of stormwater.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Handling and use of pesticides, fertilizers, and other chemicals	Any spills are cleaned up immediately. Alternatives to chemicals are used when possible. Chemicals are applied according to the label.	Chemical applications used according to label. Spills are not cleaned up.	Spills are not cleaned up. Products are used in higher amounts than what the label recommends.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Pet and animal wastes	Buried away from gardens, wells or ditches; placed in the garbage for disposal.	Animal wastes are left to decompose on grass or soil. Wastes are scattered over a wide area.	Animal wastes are left on paved surfaces; concentrated in pen or yard areas; or dumped in a ditch.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High

Assessment Sheet 2-Minimizing Runoff

Use this Assessment Sheet to identify potential environmental risks. For each question indicate your risk level in the right-hand column. Some choices may not correspond exactly to your situation. Choose the response that best fits. When finished turn to the **Action Worksheet** on page 1-11 and record your medium and high-risk practices. Your goal is to lower your risks. Use the BMP recommendations in this manual to help you determine the best solution.

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Bare soil, gardens, and construction projects	Areas of bare soil are seeded and topped with a layer of mulch. Sediment retention barriers (straw wattles and silt fences) are used until vegetation is established.	Soil is left bare during construction, but natural features and vegetation slow most runoff.	Soil is left bare and no natural features or sediment retention barriers are used.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Impervious areas (rooftops, paved sidewalks, driveways, and roads).	Paved surfaces are minimized; pavers used instead. Runoff from impervious surface areas is diverted into vegetated buffer to prevent drainage directly to surface water.	Some small areas are paved for patios.	A lot of surfaces on property are impervious to water. These areas also drain water directly into lake, river or stream.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Roof drainage	Downspouts direct roof drainage onto lawn, rain garden or vegetated area.	Some downspouts discharge water onto paved surfaces or grassy areas.	Most or all downspouts discharge onto paved or bare soil surfaces.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Landscaping and vegetated buffers	Yard is landscaped to slow the flow of stormwater and provide areas where water soaks into the ground. Thick vegetative buffer is left along shoreline.	Yard is relatively flat with landscaping that allows water to soak in. Mowed grass or spotty vegetation exists adjacent to shoreline.	There is no landscaping to slow flow of stormwater. Steep slopes and shoreline are eroding.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High
Septic system	Stormwater runoff diverted away from drainfield.	Some stormwater runoff flows over septic drainfield, but only a small amount.	Stormwater runoff runs toward septic drainfield and saturates the ground.	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High

ACTION WORKSHEET

Stormwater Runoff

Write all high and medium risks below.	What can you do to reduce the risks?	Set a target date for action.
<i>Sample:</i> Stormwater drains off driveway toward a steep slope located adjacent to shoreline.	Install water bar or trench drain to redirect water away from slope and into vegetated area.	Next week